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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,845	03/26/2002	Alan H. Greenaway	124-925	2457

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EXAMINER
JUBA JR, JOHN

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/049,845	GREENAWAY ET AL.	
	Examiner	Art Unit	
	John Juba	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *Mach 24 and 27, 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

Applicants' claim for priority under 35 U.S.C. §119(a)-(d) is acknowledged. The copy of the certified priority document customarily provided by WIPO (and stamped Priority Document") is acknowledged as having been *constructively* received.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 – 5, 7 – 9, and 11 - 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee (U.S. Patent 6,043,935). Referring *for example* to Figure 4 and the associated text, Lee discloses an optical system (450)(440) associated with a first optical transfer function, a "hologram" (430), ancillary optical modules (416) and (426) and detecting means (414) and (424) arranged and cooperating as recited. One of ordinary skill will appreciate that a "hologram" is a species of diffraction grating. Thus, Lee discloses a diffraction grating (430). It will be appreciated that while light is diffracted to detector (414) in the zero order, the light diffracted to detector (424) is a non-zero order. Notwithstanding the fact that the lens (450) of Lee *inherently* has a

finite focal depth, whereby light is received from a plurality of infinitesimally thin object planes near "layer" (460) or (470), the grating (430) in fact selectively acts upon light received from a plurality of object planes (460) and (470), and selectively produces a plurality of diffraction orders.

With regard to claims 2 – 5, the ancillary modules are disclosed as compensating for a difference in plate thickness in object space. The examiner believes this to be a clear teaching of providing different defocus for aberration correction, and providing different degrees of (corrective) spherical aberration.

With regard to claims 7, 12, and 13 it should be apparent from the description of the "hologram" in columns 3 and 4 that Lee discloses a phase grating etched in glass. the claim is believed to encompass every conceivable species of grating. Accordingly, Lee discloses such a grating. From the phase function, the grating lines are curvilinear, rather than plane parallel.

With regard to claim 8, Lee discloses the maximum theoretical diffraction efficiency as corresponding to 40.5%. One of ordinary skill would recognize this maximum theoretical diffraction efficiency as corresponding to that of a two-level phase only grating structure having the single phase depth *d*, as described by Lee at Column 4, lines 30 – 35.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi, in view of Lee (U.S. Patent number 6,043,935). To the extent that it *may be* held that the claims require the grating to act upon light *simultaneously* from multiple object planes to produce a plurality of diffraction orders *simultaneously* (and the examiner believes this is *not* the case), claims rejected as being anticipated by Lee are also included in this rejection.

Referring *for example* to Figure 3 and the associated text, Takahashi discloses a diffraction grating ("hologram" 5) for acting upon light incident *simultaneously* from a plurality of object planes (see Figs. 5B, 5C) and diffracting light from the plurality of planes *simultaneously* into different orders to be focused on each of a plurality of transversely separated detectors (6)(7)(8). Thus, Takahashi discloses the invention substantially as claimed. However, Takahashi does not disclose a plurality of "ancillary modules" cooperating with the detectors, as recited.

In the same field of endeavor, Lee discloses a system in which different diffraction orders are directed to different detectors from object planes which are axially separated. Lee teaches that the inclusion of ancillary units ("holograms") permits correction of aberrations as appropriate for each diffracted beam (Col. 5).

It would have been obvious to one of ordinary skill to include an ancillary unit with each of the detectors of Takahashi, in the interest of correcting for aberration in each of the diffracted beams, as suggested by Lee.

With regard to claims 2 – 5, the ancillary modules of Lee are disclosed as compensating for a difference in plate thickness in object space. The examiner believes this to be a clear teaching of providing different defocus for aberration correction, and providing different degrees of (corrective) spherical aberration.

With regard to claims 6 – 8, 12, and 13, Takahashi discloses at least two "holograms", interferometrically recorded. It will be appreciated that a hologram is just a species of diffraction grating. As shown in Figure 4B, two gratings are provided, each with curvilinear grating lines which are not "plane parallel". Further, Lee, et al teaches that a holographic element can be generated by computer patterning and subsequent etching. It will be appreciated that the computerized production method eliminates the need for sensitive interferometric equipment and skilled laboratory personnel. Thus, with regard to claims 7 and 8, it appears that it would at least have been obvious to provide the grating in the form of a two-level phase grating, in the interest of more convenient mass production, and in the interest of achieving nearly the maximum theoretical diffraction efficiency, as suggested by Lee.

With regard to claim 10, the storage medium of Takahashi fairly comprises a "three dimensional optical storage medium", as recited.

Response to Amendment

The examiner previously noted that receipt of the *copy* of the certified priority document was indicated in the Notice of Acceptance (PCT/DO/EO 903). Applicants are correct in noting that the receipt is instead indicated in the Notification of Missing

Requirements (PCT/DO/EO 905). In any event, it appears that the Office has misplaced the *copy* provided by WIPO. The examiner only intended to alert Applicants that the *copy* of the certified copy is *not* in the file.

Applicants' amendment is sufficient in overcoming the previous rejection of claims 7 under 35 U.S.C. § 112, second paragraph.

The rejection of claim 1 under 35 U.S.C. §102(b) as being anticipated by SONY (JP 08-043759 A) has been overcome by amendment. Applicants are correct in their characterization of the distinguishing features.

The rejection of claims 1, 2, and 6 – 10 under §102(b) as being anticipated by Maeda, et al (U.S. Patent number 5,115,243) has been overcome by the Applicants' amendment of claim 1. The examiner concurs with Applicants' characterization of the distinguishing features.

Applicants' remarks concerning the apparatus of Lee have been fully considered, but are not found persuasive. Applicants argue on one hand that the grating of the claimed apparatus *simultaneously* acts on light from plural object planes to produce a plurality of diffraction orders, while on the other hand, strike the recitation "producing simultaneously" from the claims (claim 1). The examiner believes that nothing in the amended claims requires these actions to be undertaken simultaneously, as argued by Applicants.

Applicants apparently take issue with the examiner's characterization of the hologram (430) of Lee as diffraction grating. What Lee rather loosely terms a "hologram" is a computer-generated modified (phase) zone plate. The artisan will

appreciate that the resulting structure is, in fact, a curvilinear phase grating. Broadly speaking, a "hologram" is just a special form of diffraction grating.

Applicants also take issue with the examiner's characterization of holograms (416) and (426) as "ancillary modules". These elements are holographic optical elements that modify the optical transfer function of the system defined along the respective axes. The examiner finds no *definition* of an "ancillary unit" as would distinguish over the structures disclosed by Lee.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kamatani (U.S. Patent number 5,966,364) disclose a multi-focal optical head for used with a multi-layered optical storage medium.

Lee, et al (U.S. Patent number 5,933,401) disclose a multi-focal optical head with separate modules for data read from separate object planes.

Mori, et al disclose a multi-focal optical head and teach that where the system is capable of multiple focal points respectively chosen for substrates having different thicknesses, the system is equivalently suited for use with a single substrate having data recorded at object planes which are axially separated (Col. 7, lines 14-28).

Komma, et al (U.S. Patent number 5,815,293) disclose dual focus optical head for reading an optical disk with data recorded at different object planes (Fig. 53).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (703) 308-4812. The examiner can normally be reached on Mon.-Fri. 9 - 5.

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JOHN JUBA
PRIMARY EXAMINER
Art Unit 2872

May 30, 2003